

## **Statement of Status and Support for all Changes to the Claims**

### **Fair Basis - Claim 4**

New claim 4 relates to an assisted reverberation or room acoustic enhancement system including multiple microphones positioned to pick up reverberant sound in a room, multiple loud speakers to broadcast sound into the room, and a multichannel reverberator comprising: multiple signal inputs, one for each input channel, and which receive similar bandwidth signals from the microphones, feedback comb filter networks each including a feed forward stage to provide a substantially constant multi-channel power gain, and a cross-coupling network cross-coupling the cone filters to increase the reverberation echo density.

The multichannel reverberator is as described and claimed in the patent as issued.

The patent also provides support for a claim as now proposed directed to an assisted reverberation or room acoustic enhancement system as defined, incorporating the multichannel reverberator. Such an assisted reverberation or room acoustic enhancement system is illustrated in Fig 1 of the patent as issued, and is referred to in the patent issued at column 2 lines 9 to about 30. The patent here refers to a system, also described in PCT international application NZ93/00041, which has now issued as US patent 5,862,233:

“In this system (Fig 1) microphones pick up the sound in the primary room and the microphone signals are feed into a secondary room and are reverberated and scaled by the loop gain before being fed back into the primary room. In practice the secondary room is replaced with the reverberation matrix. This improved system allows the apparent volume in the primary room to be altered independently of the apparent absorption. The approved system shall be denoted VRA (Variable Room Acoustics).”

The patent as issued under the heading DISCLOSURE OF INVENTION goes on to describe use of the multichannel reverberator comprising feedback comb filter networks including feed forward stages to provide constant power of multichannel power gain and a cross-coupling network in this VRA system as follows:

“The present invention provides a class of multichannel reverberator which produces a low degree of fluctuation in a multi dimensional sense. The class of reverberator allows the VRA system to produce identical or at least similar colouration performance to the MCR system for the same power gain.....”

#### **Patentability - Claim 4**

The invention defined in new claim 4 is novel over what is disclosed in the Gerzon documents. *Unitary (energy-preserving) multichannel networks with feedback* (Reference 1) published on 27 May 1976 does not disclose an assisted reverberation or room acoustic enhancement systems incorporating a unitary reverberator, as claimed in claim 4.

*Synthetic Stereo Reverberation* parts 1 and 2 (reference 2 and 3 respectively) published in 1971 and 1972 describe the use of orthogonal feedback matrices in generating reverberation for stereophonic recording of a live performance in a studio environment, but not using a unitary reverberator for an assisted reverberation or room acoustic enhancement system, such as defined in claim 4.

These references disclose attempting to produce more “natural” sounding recordings using a unitary matrix in an open loop system. In contrast, the present invention applies a unitary matrix to reduce regenerative colouring in a closed loop system.

Claims 5 and 6 should be novel by virtue of their dependency from claim 4.

### **Fair Basis - Claim 7**

New claim 7 relates to a multi-channel unitary reverberator comprising multiple signal inputs, one for each input channel, a number of feedback comb filter networks connected one to each signal input, each comb filter network including a feed forward stage to provide a substantially constant multi-channel power gain at audio frequencies, wherein there is one multiplier for each channel residing in both the feed forward and feedback networks, a cross-coupling network cross coupling the comb filters to increase reverberation echo density, and multi signal outputs one for each output channel.

The patent provides support for a unitary reverberator with one multiplier in each feed forward and feedback network. For example, Figure 5 discloses such a reverberator. We also refer the Examiner to column 6, lines 7 to 58 of the granted patent, which describe the particular form of the unitary reverberator shown in Figure 5.

### **Patentability - Claim 7**

The invention defined in new claim 7 is novel over what is disclosed in the *Gerzon* documents. The particular configuration invented by the patentee and shown in Figure 5 requires only one multiplier in each feed forward and feedback channel. The reverberator disclosed by *Gerzon* requires three multipliers.